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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Steven R. Walther
Serial No:	Reissue Application for U.S. Patent 6,323,497
Filed:	Herewith
For:	METHOD AND APPARATUS FOR CONTROLLING ION IMPLANTATION DURING VACUUM FLUCTUATION
Examiner:	Not Yet Assigned
Art Unit:	Not Yet Assigned

MAIL STOP REISSUE
Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Dear Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS

Please amend claim 2 as follows:

2. (Amended) An ion implantation system comprising:

a beam generator that generates an energetic ion beam and directs the beam along an ion beam path toward a semiconductor wafer;

a detector that detects an ion beam current;

a wafer drive that moves the semiconductor wafer in a direction transverse to the ion beam path; and

a controller that receives signals from the detector representative of a detected ion beam current, detects a vacuum fluctuation based on a difference value determined from an ion beam current reference value, which corresponds to an ion beam current in the absence of vacuum

fluctuations along the ion beam path, and a [the] detected ion beam current measured in the presence of vacuum fluctuations along the ion beam path, and controls the wafer drive to adjust a wafer scan rate to compensate for the vacuum fluctuation during implantation.

Please cancel claim 10 without prejudice or disclaimer.

Please add new claims 16-43 as follows:

16. An ion implantation system comprising:

a beam generator that generates an energetic ion beam and directs the ion beam toward a semiconductor workpiece;

a detector that detects an ion beam current; and

a controller that receives signals from the detector representative of a detected ion beam current, and controls at least one ion implantation parameter to compensate for vacuum fluctuation during implantation based on a difference value determined from an ion beam current reference value, which corresponds to an ion beam current in the absence of vacuum fluctuations along an ion beam path, and the detected ion beam current.

17. The system of claim 16, wherein the controller controls the at least one ion implantation parameter based on the difference value and not based on a detected pressure.

18. The system of claim 16, wherein the controller scales the difference value to account for non-line of sight and line of sight charge exchanging collisions experienced by ions in the ion beam along the ion beam path.

19. The system of claim 18, wherein the difference value is scaled based on a ratio of line of sight collisions to non-line of sight collisions.

20. The system of claim 16, further comprising a vacuum system, and wherein the controller controls the vacuum system to begin evacuation based on the determined difference value.

21. The system of claim 16, wherein the detector is a Faraday cup positioned adjacent a semiconductor wafer.

22. The system of claim 16, wherein the beam generator includes an angle corrector magnet.

23. The system of claim 16, wherein the ion beam current reference value is determined based on an ion beam current measured while a vacuum level along the ion beam path is stable.

24. The system of claim 16, wherein the ion beam current reference value is retrieved by the controller from a memory.

25. The system of claim 16, wherein the controller adjusts an ion implantation parameter to adjust for semiconductor workpiece dosing non-uniformity in two dimensions.

26. The system of claim 16, wherein the at least one ion implantation parameter includes one of a wafer scan rate and a beam scan rate.

27. The system of claim 16, wherein the controller determines an adjusted difference value using a scale factor and the difference value, and uses the adjusted difference value to control the at least one ion implantation parameter.

28. The system of claim 16, wherein the controller controls the at least one ion implantation parameter based on the difference value and a scale factor that is mathematically derived by modeling the implantation system.

29. The system of claim 28, wherein the controller uses a scale factor that has been determined based on calculated beam path length*neutral particle density products that are obtained, at least in part, from a model of an ion beam path and a vacuum system in the implantation system.

30. An ion implantation system comprising:

a beam generator that generates an energetic ion beam and directs the ion beam along an ion beam path toward a semiconductor workpiece, the ion beam path being non-linear;

a detector that detects an ion beam current; and

a controller that receives signals from the detector representative of a detected ion beam current, and controls at least one ion implantation parameter based on the detected ion beam current and a ratio of line of sight to non-line of sight collisions between particles in the ion beam and other particles along the ion beam path to compensate for vacuum fluctuation during implantation.

31. The system of claim 1, wherein the means for adjusting determines a difference value between the ion beam current reference value, which corresponds to an ion beam current in the absence of vacuum fluctuations along an ion beam path, and the measured ion beam current.

32. The system of claim 31, wherein the means for adjusting scales the difference value to account for non-line of sight and line of sight charge exchanging collisions experienced by ions in the ion beam along the ion beam path.

33. The system of claim 31, wherein the means for adjusting controls the at least one ion implantation parameter based on the difference value and a scale factor that is mathematically derived by modeling at least a portion of the implantation system.

34. The system of claim 31, wherein the means for adjusting uses a scale factor that has been determined based on calculated beam path length*neutral particle density products that are obtained, at least in part, from a model of an ion beam path and a vacuum system in the implantation system.

35. The system of claim 31, wherein the means for adjusting adjusts the ion implantation parameter based on a ratio of line of sight collisions to non-line of sight collisions experienced by ions in the ion beam along the ion beam path.

36. The system of claim 1, further comprising a vacuum system, and wherein the means for adjusting controls the vacuum system to begin evacuation based on the determined difference value.

37. The system of claim 1, wherein the means for measuring includes a Faraday cup positioned adjacent a semiconductor workpiece.

38. The system of claim 1, wherein the means for generating includes an angle corrector magnet.

39. The system of claim 1, wherein the ion beam current reference value is determined based on an ion beam current measured while a vacuum level along an ion beam path is stable.

40. The system of claim 1, wherein the means for determining retrieves the ion beam current reference value from a memory.

41. The system of claim 1, wherein the means for adjusting detects a vacuum fluctuation based on a difference value determined from an ion beam current reference value, which is an ion beam current measured in the absence of vacuum fluctuations along an ion beam path, and an ion beam current measured in the presence of vacuum fluctuations along the ion beam path.

42. The system of claim 1, wherein the means for adjusting adjusts an ion implantation parameter to adjust for wafer dosing non-uniformity in two dimensions.

43. The system of claim 1, wherein the at least one ion implantation parameter includes one of a wafer scan rate and a beam scan rate.